

NEC



NATIONAL ELECTRICAL CODE

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LEC#9

695 FIRE PUMPS

695.6(B)(1) CABLE SIZE FOR FIRE PUMPS + JOCKEY PUMPS + ACCESSORIES

695.4(B)(2) (A) CIRCUIT BREAKER SIZE FOR FIRE PUMPS + JOCKEY PUMPS + ACCESSORIES (AT CASE ONE SOURCE).

695.4(B)(2) (B) CIRCUIT BREAKER SIZE FOR FIRE PUMPS + JOCKEY PUMPS + ACCESSORIES (AT CASE GENERATOR SOURCE).

695.5 TRANSFORMERS SIZE

695.6(C) OVERLOAD PROTECTION.

695.3(D)(1) GENERATOR CAPACITY

695.3(A)(1) TAP AHEAD OF MAIN DISTRIBUTION BOARD

695.7 VOLTAGE DROP

EXA .FPI



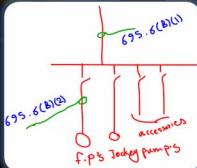
695 FIRE PUMPS

695.6(B)(1) CABLE SIZE FOR FIRE PUMPS+ JOCKEY PUMPS +ACCESSORIES.

(B) Conductor Size.

(1) **Fire Pump Motors and Other Equipment.** Conductors supplying a fire pump motor(s), pressure maintenance pumps, and associated fire pump accessory equipment shall have a rating not less than 125 percent of the sum of the fire pump motor(s) and pressure maintenance motor(s) full-load current(s), and 100 percent of the associated fire pump accessory equipment.

Jockey pump



الكابل المغذى لمجموعة من ال fire pumps و ال jockey pumps وبعض أحمال إكسسوارات ال fire pump يساوى الاتى

CABLE=FULL LOAD AMPERE OF (FIRE PUMP+ JOCKEY PUMP)X1.25+ALL ACCESSORIESX1

695.6(B)(2) CABLE FIRE PUMP MOTORS ONLY.

(2) **Fire Pump Motors Only.** Conductors supplying only a fire pump motor shall have a minimum ampacity in accordance with 430.22 and shall comply with the voltage drop requirements in 695.7.

الكابل المغذى لل fire pumps ارجع ل 430.22 section

CABLE=FULL LOAD AMPERE OF FIRE PUMP X1.25

695.4(B)(2) (A) CIRCUIT BREAKER SIZE FOR FIRE PUMPS+ JOCKEY PUMPS + ACCESSORIES (AT CASE ONE SOURCE).

(2) **Overcurrent Device Selection.** Overcurrent devices shall comply with (a) or (b).

(a) **Individual Sources.** The overcurrent protective device(s) shall be rated to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current

القاطع العمومي لمجموعة من ال fire pumps و ال jockey pumps وبعض أحمال إكسسوارات ال fire pump يساوى الاتى

CIRCUIT BREAKER= LOCKED-ROTOR CURRENT OF (FIRE PUMP+ JOCKEY PUMP) +ALL ACCESSORIESX1

LOCKED-ROTOR ملحوظة دائما من الجداول يكون ال

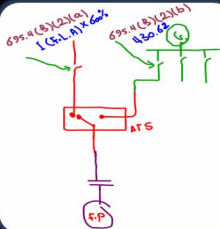
يساوى 600 % **CURRENT**

695.4(B)(2) (B) CIRCUIT BREAKER SIZE FOR FIRE PUMPS + JOCKEY PUMPS + ACCESSORIES (AT CASE GENERATOR SOURCE).

(b) *On-Site Standby Generators.* Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized to allow for instantaneous pickup of the full pump room load, but shall not be larger than the value selected to comply with 430.62 to provide short-circuit protection only. [20:9.6.1.1]

القواطع العمومي لمجموعة من ال fire pumps و ال jockey pumps وبعض أحمال إكسسوارات ال fire pump يساوي الاتي

CIRCUIT BREAKER= 430.62



695.5 TRANSFORMERS SIZE

(A) *Size.* Where a transformer supplies an electric motor driven fire pump, it shall be rated at a minimum of 125 percent of the sum of the fire pump motor(s) and pressure maintenance pump(s) motor loads, and 100 percent of the associated fire pump accessory equipment supplied by the transformer.

يجب مراعاة إضافة 25% من حمل كل من ال (FIRE PUMP+ JOCKEY PUMP) مضاف إليه الأحمال الصغيرة (الإكسسوارات) عند حساب مقاس المحوّل

هـام جداً إذن نقوم بإضافة هذا إلى ال **CONTINUITY** فتكون كالتالي **RULE**

TRANSFORMER SIZE = CONTINUOUS LOAD X 1.25 + NON CONTINUOUS LOAD X 1.25 OF LARGEST MOTOR + MOTORS LOAD + 1.25 X (FIRE PUMP + JOCKEY PUMP)

695.6(C) OVERLOAD PROTECTION.

(C) *Overload Protection.* Power circuits shall not have automatic protection against overloads. Except for protec-

695.6(C) prohibits power circuits of fire pump from being protected by overloads in order to remain operational during fires or other hazards.

هذا المقال يحرم استخدام overload protection لل fire pump للحفاظ عليها تعمل حتى لو حدث overloading بنسب في حرق الكبل

695.3(D)(1) GENERATOR CAPACITY

(1) **Capacity.** The generator shall have sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load(s). [20:9.6.1.1]

Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted.

هذا الـ SECTION يعبر عن سعة المولد يجب أن تكون كافية لنسمح بالـ **STARTING** والـ **RUNING** للـ **fire pump** حيث يتم عزل (**shedding**) أوتوماتيكى لبعض الأحمال الغير ضروري عملها

IMPORTANT NOTE

equipment. These two main requirements ensure that the fire pump will operate in the event of a fire without being accidentally disconnected, and that the fire pump will continue to operate until the fire is extinguished, the fire pump is purposely shut down, or the pump itself is destroyed.

الـ **fire pump** تستمر في العمل حتى يتم إطفاء الحريق أو تفصل عمداً أو حتى هي نفسها تدمر وهذا أكبر دليل على عدم استخدام الـ **over load**

695.3(A)(1) TAP AHEAD OF MAIN DISTRIBUTION BOARD

قبل = AHEAD OF

(1) **Electric Utility Service Connection.** A fire pump shall be permitted to be supplied by a separate service, or from a connection located ahead of and not within the same cabinet, enclosure, or vertical switchboard section as the service disconnecting means. The connection shall be located and arranged so as to minimize the possibility of damage by fire from within the premises and from exposing hazards. A tap ahead of the service disconnecting means shall comply with 230.82(5). The service equipment shall comply with the labeling requirements in 230.2 and the location requirements in 230.72(B). [20:9.2.2(1)]

الـ **FIRE PUMP** إما تغذى مباشرة من موصل الخدمة من الحكومة أو قبل اللوحة العمومية للمنشأة أى بعد المحوّل مباشرة إذا كان هناك محوّل .

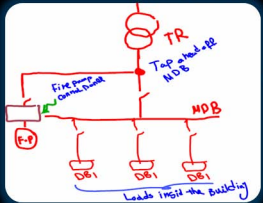


FIG1

لاحظ ان الشكل 1 و 2 مثل بعض ولكن الشكل 2
يوضح تفصيليا كيفية التنفيذ

الشكل 3 يوضح الوضع الخاطئ الذي لا يصح أن
يكون الـ FIRE PUMP مغذاة من اللوح العمومية
وليس منفصلة عنها وتكون أيضا قبلها

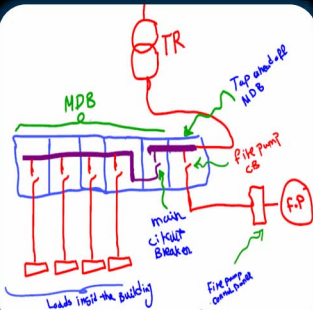


FIG 2

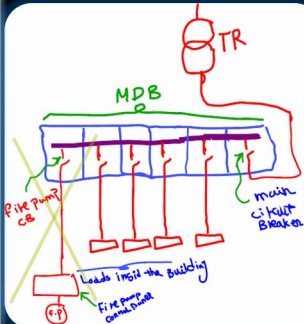


FIG 3

695.7 VOLTAGE DROP

(A) **Starting.** The voltage at the fire pump controller line terminals shall not drop more than 15 percent below normal (controller-rated voltage) under motor starting conditions.

VOLTAGE DROP ≤ 15% AT STARTING

(B) **Running.** The voltage at the motor terminals shall not drop more than 5 percent below the voltage rating of the motor when the motor is operating at 115 percent of the full-load current rating of the motor.

VOLTAGE DROP ≤ 5 % AT RUNNING, calculated at 115% of FLA not 100% كالمعناد

EXA.FP1

لوحة بها FIRE PUMP و Jockey pump وبعض احمال بسيطة
(اكسسوارات) بالرجاء حساب النقاط من 1 إلى 6

Fire pump 100 KVA = $100/1.73/380 = 152 \text{ A}$

Jockey pump 3 KVA = $3/1.73/380 = 4.5 \text{ A}$

Accessories 3 KVA = $3/1.73/380 = 4.5 \text{ A}$

(1) CIRCUIT BREAKER 695.4(B)(2)(A)=LOCKED-ROTOR CURRENT OF (FIRE PUMP+ JOCKEY PUMP) +ALL ACCESSORIESX1

$$=152*6+4.5*6+4.5*1= 943.5\text{A}= 1000 \text{ A}$$

(2) CABLE 695.6(B)(1)===FULL LOAD AMPERE OF (FIRE PUMP+ JOCKEY PUMP)X1.25+ALL ACCESSORIESX1

$$=152*1.25+4.25*1.25+4.5= 199.8 \text{ A}=70\text{MM}^2$$

(3) CIRCUIT BREAKER OR DISCONNECT 695.4(B)(2)(A)=LOCKED-ROTOR CURRENT OF (FIRE PUMP+ JOCKEY PUMP) +ALL ACCESSORIESX1

$$=152*6+0+0=912= 1000 \text{ A}$$

(4) CABLE 695.6(B)(2)===FULL LOAD AMPERE OF (FIRE PUMP)X1.25

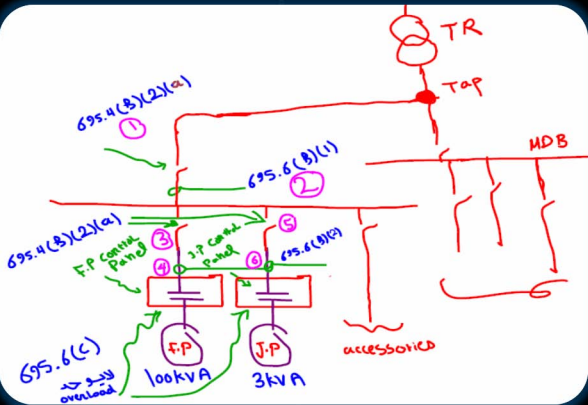
$$=152*1.25= 190 \text{ A}=70\text{MM}^2$$

(5) CIRCUIT BREAKER OR DISCONNECT 695.4(B)(2)(A)=LOCKED-ROTOR CURRENT OF (FIRE PUMP+ JOCKEY PUMP) +ALL ACCESSORIESX1

$$=0+4.5*6+0=27= 32 \text{ A}$$

(6) CABLE 695.6(B)(2)===FULL LOAD AMPERE OF (FIRE PUMP)X1.25

$$=4.5*1.25=5.6 \text{ A}=2.5 \text{ MM}^2$$



Cable selection current (Amp)

199.8

Circuit breaker size

1

1000

AT

Cable size

2

70

mm²

No. of parallel cables /ph

1

C.B selection current(Amp)

943.5

1000

AF

Total catalogue Ampacity

220

Amp

Adjusted Ampacity

220

Amp

Cable selection current (Amp)

190.0

Circuit breaker size

3

1000

AT

Cable size

4

70

mm²

No. of parallel cables /ph

1

C.B selection current(Amp)

912.0

1000

AF

Total catalogue Ampacity

220

Amp

Adjusted Ampacity

220

Amp

Cable selection current (Amp)

5.6

Circuit breaker size

5

32

AT

Cable size

6

2.5

mm²

No. of parallel cables /ph

1

C.B selection current(Amp)

27.0

100

AF

Total catalogue Ampacity

29

Amp

Adjusted Ampacity

29

Amp

EXA.FP1